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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,772	09/17/2003	Richard I. Masel	1201.68148	4868

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GREER, BURNS & CRAIN, LTD.  
Suite 2500  
300 South Wacker Drive  
Chicago, IL 60606

EXAMINER
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YUAN, DAH WEI D

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 04/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/664,772

Applicant(s)

MASEL ET AL.

Examiner

Dah-Wei D. Yuan

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) 1-16 and 24-50 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>06212004.05202005</u> | 6) <input type="checkbox"/> Other: _____  |

**ORGANIC FUEL CELLS AND FUEL CELL CONDUCTING SHEETS**

Examiner: Yuan      S.N. 10/664,772      Art Unit: 1745      April 24, 2006

***Election/Restrictions***

1. Applicant's election with traverse of Group I-2, claims 17-23, in Paper filed March 6, 2006 is acknowledged. The traversal is on the ground(s) that all the species read upon two embodiments disclosed in the specification and are illustrated in Figures 1 and 13. This is not found persuasive because where two or more species are claimed, a requirement for restriction to a single species may be proper if the species are mutually exclusive. Different species are mutually exclusive if one claim recites limitations disclosed for a first species but not in other species. The species I-1 to I-4 are distinct for the reasons given in the Office action dated January 31, 2006 and search required for one species is not required for other species, therefore, restriction for examination purposes as indicated is proper. Claims 1-16 and 24-50 are withdrawn from consideration.

***Claim Rejections - 35 USC § 102/103***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 17-19,21 are rejected under 35 U.S.C. 102(a) as anticipated by Ha et al. (J. Power Source 112 (2002) 655-659).

Ha et al. teach the use of methanol and formic acid as the fuel for fuel cells, wherein the fuel cell comprising an anode, a cathode and a solid polymer electrolyte (a Nafion membrane). The use of 9 M formic acid and methanol can increase the current at 60°C from 95 to 320 mA/cm<sup>2</sup> at 0.3V. The maximum power density increases from 33 to 119 mW/cm<sup>2</sup>. The cell resistance decreases from 0.37 to 0.32 cm<sup>2</sup>. See abstract, page 655-656.

With respect to claim 21, it is well known in the art that anode and the solid polymer membrane are required to be held together by a sealant such that intimate contact between the two components can be established. It would be necessarily intrinsic that the sealant is resistant to the corrosion of formic acid in the organic liquid fuel.

5. Claims 17-19,21 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Davis (US 5,904,740).

With respect to claim 17, Davis teaches an organic/air fuel cell, wherein an organic fuel such as methanol, formaldehyde, or formic acid is oxidized to carbon dioxide at an anode, while

air or oxygen is reduced to water at the cathode. A solid polymer membrane of a perfluorinated proton-exchange membrane material, which is substantially impervious to the organic fuel solution, is disposed between the anode and the cathode. In one embodiment, methanol is used as the alcohol in the fuel and formic acid is added to the fuel as a carboxylic acid additive. The concentration of the formic acid is up to 20% by weight, i.e. about 43 M. See Abstract, Column 2, Lines 52-59, Column 4, Lines 59-67. Moreover, it is the position of the examiner that other properties of said fuel cell, such as power density, are inherent, given that the organic fuel cell disclosed by Davis and the present application having substantially the same anode, cathode, solid polymer membrane and organic fuels. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. In re Robertson, 49 USPQ2d 1949 (1999).

Alternatively, it would have been obvious to one of ordinary skill in the art to adjust the concentrations of the methanol and formic acid in the liquid fuel solution disclosed by Davis in order to provide appropriate electrochemical performance and power density for specific applications.

With respect to claims 18,19, the disclosure of Davis differs from Applicant's claims in that Davis does not disclose the fuel solution is at least 4.4 or 8.8 M formic acid. However, it would have been within the skill of the ordinary artisan to adjust the amount of the formic acid in the liquid fuel solution used in the anode chamber to yield higher or lower power output of the fuel cell system. *Discovery of optimum value of result effective variable in known process is*

*ordinarily within skill of art.* In re Boesch, CCPA 1980, 617 F.2d 272, 205 USPQ215. In addition, it is the position of the examiner that disclosure provides no evidence of criticality with regard to the concentration of the formic acid in the organic fuel solution.

With respect to claim 21, it is well known in the art that anode and the solid polymer membrane are required to be held together by a sealant such that intimate contact between the two components can be established. It would be necessarily intrinsic that the sealant is resistant to the corrosion of formic acid in the organic liquid fuel.

6. Claims 18,19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 5,904,740) as applied to claims 17,21 above and further in view of Ha et al. (J. Power Source 112 (2002) 655-659).

The disclosure of Davis differs from Applicant's claims in that Davis does not disclose the fuel solution is at least 4.4 or 8.8 M formic acid. Ha et al. teach the use of methanol and formic acid as the fuel for fuel cells. The use of 9 M formic acid and methanol can increase the current at 60°C from 95 to 320 mA/cm<sup>2</sup> at 0.3V. The maximum power density increases from 33 to 119 mW/cm<sup>2</sup>. The cell resistance decreases from 0.37 to 0.32 cm<sup>2</sup>. See abstract, page 655-656. Therefore, it would have been obvious to one of ordinary skill in the art to use 9 M formic acid and methanol as the fuel onto the fuel cell of Davis, because Ha et al. teach the use of such fuel can improve the performance of the organic fuel cell.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 5,904,740) as applied to claims 17-19,21 above and further in view of Beckmann et al. (US 2003/0170508 A1).

Davis describes a direct organic fuel cell as described in Paragraph 5 above. The disclosure of Davis differs from Applicant's claims in that Davis does not disclose the anode enclosure has a gas remover configured to allow passage of CO<sub>2</sub> from the enclosure. Beckmann et al. teach a direct oxidation fuel cell wherein the anode chamber provides an opening (72) that allows the carbon dioxide exits the housing and a second opening (71) to allows the exit of dilute fuel and water. The opening can promote circulation of the fuel solution as gas travels therethrough. See Paragraph 41. Therefore, it would have been obvious to one of ordinary skill in the art to add a gas remover to the anode enclosure of Davis, because Beckmann et al. teach the use of such feature to remove the carbon dioxide in the anode enclosure.

8. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 5,904,740) as applied to claims 17-19,21 above and further in view of Beckmann et al. (US 2003/0170508 A1).

Davis describes a direct organic fuel cell as described in Paragraph 5 above. However, Davis does not teach or suggest the fuel cell further comprising replaceable fuel cartridge. Hirsch et al. teach a fuel cell system comprising a replaceable fuel cartridge (4), which is connected to the fuel cell via a duckbill valve (55). The fuel cartridge that provides fuel to the anode can reduce the risk of cathode flooding and keep the cost and complexity of the fuel cell to

a minimum. See Column 3, Lines 47-51; Column 9, Lines 45-60. Therefore, it would have been obvious to one of ordinary skill in the art to add a replaceable fuel cartridge to the fuel cell of Davis, because Hirsch et al. teach the use of a fuel cartridge to reduce the risk of cathode flooding and keep the cost and complexity of the fuel cell to a minimum.

9. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 5,904,740) and Beckmann et al. (US 2003/0170508 A1) as applied to claims 17-19,21,22 above and further in view of Vecere (US 5,898,113).

Davis and Hirsch describe a direct organic fuel cell as described in Paragraphs 5 and 6 above. However, Davis and Hirsch do not teach or suggest the fuel cartridge is made of a PTFE material. Vecere et al. teach a sealed container that is typically made of an inert material such as TEFLON and TEDLAR. See Column 1 Lines 17-26. Therefore, it would have been obvious to one of ordinary skill in the art to use a replaceable fuel cartridge made of PTFE in the fuel cell system of Davis and Beckmann, because Vecere teaches the container made of TEFLON is inert to the environment.

### ***Double Patenting***

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed.



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Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 17-23 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of copending Application No. 10/407,385. Although the conflicting claims are not identical, they are not patentably distinct from each other because both applications claim the a direct organic fuel cell comprising liquid fuel solutions containing at least 10% by weight formic acid and at least 1.8 M formic acid, respectively. The two ranges overlap each other.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan  
April 24, 2006



**DAH-WEI YUAN**  
**PRIMARY EXAMINER**